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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,682	09/30/2004	**Chung-nin Chau**	07194.0113U1	5681

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EXAMINER	
HEVEY, JOHN A	

ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/711,682	CHAU, CHUNG-NIN	
	Examiner	Art Unit	
	JOHN A. HEVEY	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Claims 1-28 are pending and presented for examination.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (US6580224, of record) in view of Bogner et al. (US2003/0020101, of record) and Lee et al. "Development and Luminescent Characteristics of $CaSiN_2$ Based Phosphors" Journal of the Institute of Electronic Engineering of Korea, Oct. 1999, of record.

In regards to claim 1 and 17, Ishii et al. ("Ishii") teaches an electroluminescent backlight (equivalent to lamp)(see col 2, ln 43-50) comprising a blue or blue-green copper activated zinc sulfate electroluminescent phosphor

mixed with a red fluorescent phosphor in order to create white light (see col 5, ln 63 to col 6 ln 12). In short, the electroluminescent device as taught by Ishii comprises a blue or blue-green emitting electroluminescent phosphor and an additional phosphor which absorbs in the blue to green range and emits in the red light range in order to create a white emitting device. Ishii does not teach europium activated alkaline earth silicon nitride phosphor.

Bogner et al. ("Bogner") teaches a yellow to red emitting europium activated alkaline earth silicon nitride phosphor which absorbs in the blue to green spectral region (see [0008]). Bogner further appreciates the use of said europium activated alkaline earth silicon nitride materials in electroluminescent devices (see [0002]).

Lee et al. teaches the beneficial use of europium activated alkaline earth silicon nitride phosphors in electroluminescent devices (see abstract).

It would have been obvious to one of ordinary skill in the art to substitute the red phosphor as taught by Ishii with a well known red emitting phosphor as taught by Bogner. One of ordinary skill in the art would recognize the ability to substitute one blue-green absorbing, red emitting phosphor with the blue-green absorbing, red emitting europium activated alkaline earth silicon nitride taught by Bogner, wherein the use of such phosphors in electroluminescent devices is well known in the art as taught by Lee. Such a substitution would result in an electroluminescent backlight device (lamp) comprising a mixture of a blue and/or blue-green electroluminescent phosphor and a europium activated alkaline earth

silicon nitride phosphor. One of ordinary skill in the art would have been motivated to do so to increase the brightness and white emitting qualities of the electroluminescent device.

In regards to claims 2-5 and 18-21, Bogner teaches examples of europium activated alkaline earth silicon nitride red to orange emitting phosphors including $Ca_2Si_5N_8$:Eu, $Sr_2Si_5N_8$:Eu, $Ba_2Si_5N_8$:Eu, and $BaSi_7N_{10}$:Eu (see [0024] and Table 1) reading on the instant claims.

In regards to claims 6 and 22, the references fail to specifically teach a phosphor blend containing 10-20 wt% of the europium activated alkaline earth silicon nitride phosphor. However, Ishii establishes the amount of red phosphor in relation to blue/green electroluminescent phosphor is a result effective variable (see col 6, ln 35-67) in that the mixture of said phosphors may be varied in order to produce different shades and/or brightness of light. It would have been obvious to one of ordinary skill in the art at the time the invention was made to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05). One would have been motivated to do so in order to obtain an electroluminescent device with improved brightness and color and to increase the industrial applicability of the invention.

In regards to claims 7 and 23, Ishii teaches blue/blue-green emitting ZnS:Cu (see col 5, ln 63-67) as well as ZnS:Cu,Cl (see col 6, ln 24-34).

In regards to claim 8, the instant applications teaches ZnS:Cu and ZnS:Cu phosphors having emission wavelengths as those required by claim 8. As Ishii teaches the same blue-emitting and blue-green emitting phosphors, they would necessarily possess the same emission wavelengths.

In regards to claim 9, Bogner teaches examples of europium activated alkaline earth silicon nitride phosphors which are excited in the 400-460 nm range and emit in the 610-650 nm range (see [0032]).

In regards to claims 10-12, the instant application teaches combinations of ZnS:Cu and $Ca_2Si_5N_8$:Eu having CRI within the required ranges (Table 1). As the references in combination teach substantially the same electroluminescent device having a mixture of the same phosphors, it would necessarily have the same CRI.

In regards to claim 13, the references in combination teach substantially the same electroluminescent device having a mixture of the same phosphors, thus it would necessarily have the same color coordinates.

In the alternative, it is well known in the art that the relative amounts of different phosphors used, affects the emitted x and y color coordinates of the end product. It would have been obvious to one of ordinary skill in the art to optimize the relative amounts of phosphors in order to arrive at different final color coordinates.

In regards to claim 14, dependent on claim 13, the references fail to specifically teach a phosphor blend containing 10-20 wt% of the europium

activated alkaline earth silicon nitride phosphor. However, Ishii establishes the amount of red phosphor in relation to blue/green electroluminescent phosphor is a result effective variable (see col 6, ln 35-67) in that the mixture of said phosphors may be varied in order to produce different shades and/or brightness of light. It would have been obvious to one of ordinary skill in the art at the time the invention was made to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05). One would have been motivated to do so in order to obtain an electroluminescent device with improved brightness and color and to increase the industrial applicability of the invention.

In regards to claim 15, Bogner teaches specific examples including $Ca_2Si_5N_8$:Eu (see Bogner pg. 3, Table 1).

In regards to claims 16 and 25, Bogner teaches europium concentrations of 1, 2 ,3, 5, 8, and 10 atomic % compared to the alkaline earth ion (see Bogner pg. 3, Table 1).

In regards to claim 24, the instant applications teaches ZnS:Cu and ZnS:Cu phosphors having emission wavelengths as those required by claim 8. As Ishii teaches the same blue-emitting and blue-green emitting phosphors, they would necessarily possess the same emission wavelengths. Furthermore, Bogner teaches examples of europium activated alkaline earth silicon nitride

phosphors which are excited in the 400-460 nm range and emit in the 610-650 nm range (see [0032]).

In regards to claim 26, the above rejections have disclosed the combination of a blue emitting ZnS:Cu phosphor as taught by Ishii with a $Ca_2Si_5N_8$:Eu phosphor as taught by Bogner.

In regards to claim 27, Bogner teaches europium concentrations of 1, 2, 3, 5, 8, and 10 atomic % compared to the alkaline earth ion (see Bogner pg. 3, Table 1).

In regards to claim 28, the references fail to specifically teach a phosphor blend containing 10-20 wt% of the europium activated alkaline earth silicon nitride phosphor. However, Ishii establishes the amount of red phosphor in relation to blue/green electroluminescent phosphor is a result effective variable (see col 6, ln 35-67) in that the mixture of said phosphors may be varied in order to produce different shades and/or brightness of light. It would have been obvious to one of ordinary skill in the art at the time the invention was made to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05). One would have been motivated to do so in order to obtain an electroluminescent device with improved brightness and color and to increase the industrial applicability of the invention.

Response to Arguments

4. Applicant's arguments filed 2/5/2009 have been fully considered but they are not persuasive.

5. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

6. The applicant argues that Bogner and Lee are drawn to disparate inventions and it would not have been obvious to one of ordinary skill to combine the teachings of said references with Ishii to arrive at the invention as instantly claimed. This is not found persuasive. As described in the above rejection, Ishii teaches an electroluminescent device comprising a blue or blue-green emitting electroluminescent phosphor and an additional phosphor which absorbs in the blue to green range and emits in the red light range in order to create a white emitting device.

Bogner et al. ("Bogner") teaches a yellow to red emitting europium activated alkaline earth silicon nitride phosphor which absorbs in the blue to green spectral region (see [0008]). Bogner further appreciates the use of said europium activated alkaline earth silicon nitride materials in electroluminescent devices (see [0002]). Lee et al. teaches the beneficial use of europium activated alkaline earth silicon nitride phosphors in electroluminescent devices (see abstract).

While the secondary references such as Bogner may be drawn to inventions in other fields such as LEDs this is not relevant to the instant combination. It would have been obvious to one of ordinary skill in the art to substitute the red phosphor as taught by Ishii with a well known red emitting phosphor as taught by Bogner. One of ordinary skill in the art would recognize the ability to substitute one blue-green absorbing, red emitting phosphor with the blue-green absorbing, red emitting europium activated alkaline earth silicon nitride taught by Bogner, wherein the use of such phosphors in electroluminescent devices is well known in the art as taught by Lee. Such a substitution would result in an electroluminescent backlight device (lamp) comprising a mixture of a blue and/or blue-green electroluminescent phosphor and a europium activated alkaline earth silicon nitride phosphor. One of ordinary skill in the art would have been motivated to do so to increase the brightness and white emitting qualities of the electroluminescent device.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN A. HEVEY whose telephone number is (571)270-3594. The examiner can normally be reached on Monday - Friday 8:00 AM to 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. A. H./
Examiner, Art Unit 1793

/Kevin P. Kerns/
Primary Examiner, Art Unit 1793